



CDG-101US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Thomas E. McWhorter et al. : Art Unit: 1754  
Serial No.: 10/051,993 : Examiner: Ngoc Yen M. Nguyen  
Filed: January 18, 2002 :  
FOR: METHOD AND APPARATUS FOR :  
GENERATING GASEOUS  
CHLORINE DIOXIDE-CHLORINE  
MIXTURES

**DECLARATION UNDER 37 C.F.R. § 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

S I R :

Gilbert Gordon hereby declares that:

1. I am over 21 years old, and am a citizen and resident of the United States.
2. I have more than 40 years experience in the field of chlorine and chlorine dioxide chemistry
3. I am a Professor of Chemistry in the Department of Chemistry and Biochemistry at Miami University in Oxford, Ohio. I was the Chairman of the Department of Chemistry and Biochemistry at Miami University from 1973 through 1984. I was also the Volwiler Distinguished Research Professor in the Department of Chemistry at Miami University from June 1983 to May 2003. I am currently professor emeritus and continuing to direct graduate student research at Miami University. I received my doctorate in inorganic chemistry at Michigan State University, East Lansing, Michigan in 1959. My *Curriculum Vitae* is attached to this declaration.

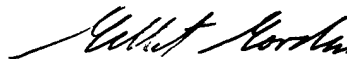
4. I have published more than 240 peer reviewed, scientific articles. The main emphasis of these articles has been to improve our understanding and knowledge of the chemistry of strong oxidizing agents and chemical disinfectants commonly used in the treatment of drinking water. I am the holder of two U.S. Patents in the field of inorganic chemistry.
5. I am also an expert in chemical equilibrium, the determination of the concentration of various inorganic species in aqueous solution, on the analysis of the rates of chemical reactions and how fast these reactions occur. In 1987, I published a book for graduate students and faculty in chemistry on how to study and understand the use of chemical equilibrium processes as used in chemical kinetics (Katakis, D.: Gordon, G. Mechanisms of Inorganic Reactions, John Wiley and Sons, (ISBN 0-471-84258-3), 1987).
6. I am not an inventor of the above-noted patent application.
7. I reviewed the specification and claims as filed, the first Office Action, Applicants' response to the final Office Action and the Final rejection issued by the USPTO in the above-identified application.
8. I have paid close attention to the Examiners rejection of claims 1, 3-29, and 38 under 35 U.S.C. 112 first paragraph, contained in the Final Rejection, which in my opinion is a restatement of the rejection of claims 1-29 under 35 U.S.C. 112 first paragraph, contained in the first Office Action.
9. I have studied applicants' response to the rejection under 35 U.S.C. 112 first paragraph, contained in the amendment filed under a certificate of mailing dated December 22, 2004.
10. Based upon my experience and the arguments put forth by applicants, I am of the firm opinion that applicants specification and claims as originally filed in the above-identified application would reasonably convey to a worker skilled in the relevant art that

at the time the application was filed the inventors/applicants had possession of the claimed invention.

11. That as set forth in the amendment by applicants referred to above that a worker skilled in the art could determine the ratio of raw materials, size the reactor and control the rate of products, without undue experimentation.
12. That a worker skilled in the art would be able to reproduce the invention without undue experimentation.
13. I have reviewed U.S. Patent 4,081,520 and am of the opinion that this patent neither anticipates nor renders the claims of the above-identified application obvious. For example applicants neither teach nor suggest using methanol to produce a mixture of gaseous chlorine and chlorine dioxide.
14. By my signature below, I hereby declare that all statements made in this document of my own knowledge are true, and all statements made on information and belief are believed to be true. Further, I hereby declare that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing on the application.

Respectfully Submitted,

Date: 26 October 2005



Dr. Gilbert Gordon  
Chemistry Professor Emeritus  
Miami University  
Oxford, OH 45056



**Gilbert Gordon**  
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### **Professional Background**

Research Professor Emeritus and Consultant (2003 - )  
Volwiler Distinguished Research Professor, Dept. of Chemistry (1973-2003)  
Miami University, Oxford, Ohio 45056 (Tel: 513 529 3336)  
Born: Chicago, Illinois, 11 November 1933  
B.S. Bradley (1955)  
Ph.D. Michigan State University (1959)  
Postdoctoral (1959) University of Chicago  
Assistant Professor (1960-64) University of Maryland  
Associate Professor (1964-67) University of Maryland  
Professor (1967) University of Maryland  
Professor (1967-73) University of Iowa  
Visiting Professor as a Guest of the Japan Society for the Promotion  
of Science (2 months 1969, 2 months 1984)  
Chemist of the Year (1981) - Cincinnati Section, American Chemical Society  
Distinguished Scientist (1982) - Technical Societies Council, Cincinnati  
Sigma Xi Researcher of the Year (1982) - Miami University Chapter  
Bradley University Distinguished Alumnus of 1986  
The Prestigious Miami University Benjamin Harrison Medallion Awarded in May 1993  
for Outstanding National and International Contributions to Education and Research  
Bradley University College of Arts and Sciences Distinguished Alumnus Award (2001)  
Miami University Distinguished Scholar Award in Recognition of Outstanding  
Achievements in Research and Scholarly Achievements (August 2002)  
Editorial Board, Synthesis in Inorganic and Metal-Organic Chemistry  
Editorial Board, Ozone Science and Engineering, Barry L. Loeb, Editor  
Treasurer, International Ozone Association, 1998 - 2001, 2004 - 2006  
President, International Ozone Association, 2002 - 2003

### **Professional Awards and Honors:**

Strathmore's Who's Who  
Who's Who Worldwide Registry  
Who's Who in the World  
Who's Who in America  
Who's Who in the Midwest  
Who's Who in Technology Today  
Who's Who in Frontier Science & Technology

### **Research Interests:**

Dynamics of Chemical Reactions (Chemical Kinetics)  
Reactions of Chlorine Dioxide, Chlorine, and Ozone  
Alternatives to Chlorine in Water Purification  
Mechanisms of Reactions of the Oxy-Halogen Species

### **Major National and International Committees:**

Member -- Standards Methods for the Examination of Water and Wastewater Standing Committee on Ozone

Member: Standards Methods for the Examination of Water and Wastewater Standing Committee on Chlorine Dioxide

Member: Standards Methods for the Examination of Water and Wastewater Standing Committee on Total Oxidants

Member: Disinfection/Disinfection By-Products Technical Advisory Workgroup (TAW) for the American Water Works Association

### **Consultant:**

U.S. Environmental Protection Agency

Evansville Water and Sewer Utility

Montgomery - Watson, Consulting Engineers

Metropolitan Water District, CA

East Bay Municipal Water District, CA

Vulcan Chemicals, Wichita, KS

San Francisco Public Utilities Commission Advisory Committee

New Jersey Department of Environmental Programs

### **RECENT LECTURES AND/OR SEMINARS (2005)**

1. Gilbert Gordon, Jason D. Keith, and Gilbert E. Pacey, "Toxic Chemical Decomposition During Digestion", Presented at the National Water Research Institute (NWRI) Board Meeting, Costa Mesa, CA, 30 April 2005.
2. Gilbert Gordon, "Is Our Drinking Water Supply Safe?", Presented at the Miami University Research Advisory Council Meeting, Miami University, 22 April 2005.
3. Jason D. Keith, Gilbert Gordon, Gilbert E. Pacey, and Joseph A. Cotruvo, "Measurement of Bromate ion Reduction in Gastric Juice Using Ion Chromatography", Presented at the Pittsburgh Conference in Orlando, FL, 3 March 2005.
4. Gilbert Gordon, Jason D. Keith, and Gilbert E. Pacey, "Bromate Ion Decomposition in Gastric Juice - Phase I", Presented at the Workshop to Evaluate the State-of-Science in All Aspects of Bromate Toxicity, American Water Works Association Research Foundation in Oxford, OH, 10 - 13 February 2005.

### **RECENT LECTURES AND/OR SEMINARS (2004)**

1. Jason D. Keith, Gilbert E. Pacey and Gilbert Gordon, "Methodology for Detection of Bromate Ion in Artificial Gastric Juice", Presented at the 2004 Pittsburgh Conference, Chicago, IL, 16 - 21 March 2004.
2. Gilbert Gordon and Aaron Rosenblatt, "Chlorine Dioxide Science and Technology: The Current State of the Art", Presented at the International Ozone Conference, Barcelona, Spain, 10 - 11 March 2004.

3. Gilbert Gordon, "Rate of Bromate Reduction in the Human Stomach", Presented at the National Water Research Institute (NWRI) Board Meeting, Casa Mesa, CA, 24 April 2004.
4. Gilbert Gordon, "Is it Important for Users of Analytical Methods to Understand the Underlying Chemistry?", Presented at the Vegyészkonferencia 2004 Magyar Spektrokémiai Vándorgyűlés Bioanalitika Szimpózium, Balatonföldvár, Hungary, 30 June - 2 July 2004.
5. Gilbert Gordon, "Chlorine Dioxide -- An Important Alternative Disinfectant and Oxidizing Agent", Presented at an Invited Lecture at the Wonju Campus of Yonsei University in Wonju, South Korea, 21 July 2004.
6. Gilbert Gordon, "OZONE -- The Underlying Chemistry and Some Unusual Analytical Problems", Presented at the Advanced Oxidation Processes and Disinfection By-products Control Workshop Supported by the Korea Society on Water Quality in Seoul, Korea, 22 July, 2004.
7. Gilbert Gordon, Jason D. Keith, Gilbert E. Pacey, Joseph A. Cotruvo, and Richard J. Bull, "Preliminary Data on the Fate of Bromate Ion in Simulated Gastric Juices", Presented by Jason Keith at the International Ozone Association - Pan American Group Regional Meeting in Windsor, Ontario, Canada, 13 September 2004.
8. Gilbert Gordon, Jason D. Keith, and Gilbert E. Pacey "Bromate Ion Decomposition in the Human Stomach" Presented at the Fall Meeting of the National Water Research Institute (NWRI) Meeting in Deerfield (Chicago), IL, 16 October 2004.

#### **RECENT LECTURES AND/OR SEMINARS (2003)**

1. Gilbert Gordon, "Ozone Residuals Measured by the Indigo Method" Presented at the 13<sup>th</sup> Annual Conference and Technology, Hokkaido University, Sapporo, Hokkaido, Japan, 12 - 13 June 2003.
2. James A. Goodrich, Roy C. Haught, Michael W. Ware, Rajib Sinha, J. Lee Heckman and Gilbert Gordon, "Evaluation of On-Site Chlorine Generators for the Disinfection of Drinking Water", Presented at the American Water Works Association Annual Conference, San Diego, CA, 6-10 June 2003.
3. Zsolt Körtvélyesi and Gilbert Gordon, "Effects of the  $\text{Cl}_2\text{O}_4^-$  Complex on the Spectrophotometric Measurement of Chlorine Dioxide", Presented at the American Water Works Association Annual Conference, San Diego, CA, 6-10 June 2003.
4. Gilbert Gordon, "Chlorine, Hypochlorite, and On-Site Hypochlorite Generation", Presented at the California - Nevada Annual Fall Conference (Water Quality Division), San Diego, CA, 9 October 2003.
5. Zsolt Körtvélyesi, Jason D. Keith, Sean Puckett, Gilbert E. Pacey and Gilbert Gordon, "Improvements in the Measurement of Low Ozone Concentrations", Presented at the World Congress of the International Ozone Association, Las Vegas, NV, 2 - 7 September 2003.

### RECENT LECTURES AND/OR SEMINARS (2002)

1. Kerwin Rakness, Gilbert Gordon, Bernie Bubnis, David Rexing, Eric C. Wert and Mark Tremel "Underestimating Dissolved Ozone Residual Using Outdated or Impure Indigo", Presented at the Pan American Regional Group Meeting, Raleigh, NC 18-22 May 2002.
2. Gilbert Gordon "International Ozone Association Involvement in the USEPA Regulatory Process", Presented at the 2002 Pan American Regional Group Conference, Raleigh, NC 18 - 22 May 2002.
3. Kerwin Rakness, Gilbert Gordon, David Rexing, and Eric C. Wert "Reported Ozone Residual Data Might Be Undervalued", Presented at the 2002 Annual Conference of the American Water Works Association, New Orleans, LA 18 - 22 June 2002.
4. Gilbert Gordon, "An Overview of Analytical Methods Associated with the Measurement of Ozone", Regional Conference, Pan American Regional Group, International Ozone Association, Mexico City, Mexico, 14 -16 September 2002.
5. Gilbert Gordon, "The Basic Chemistry of Oxidation and Disinfection", Regional Conference, Pan American Regional Group, International Ozone Association, Mexico City, Mexico, 14 -16 September 2002.
6. Gilbert Gordon, "Chlorine Dioxide Generation: Chemistry and Practicalities" Presented at the Third European Symposium on Chlorine Dioxide and Disinfection", Madrid, Spain, 24 - 25 October 2002.

### RECENT LECTURES AND/OR SEMINARS (2001)

1. Gilbert Gordon "Chlorine Dioxide Chemistry Overview: Generation Impurities and By-Products", Presented at the International Symposium on Chlorine Dioxide Sponsored by the American Chemistry Council, Las Vegas, NV 15 - 6 February 2001.
2. Gilbert Gordon "Ozone Chemistry and Measurement", Presented at the Ozone Workshop, Hong Kong, Peoples Republic of China, 4 April 2001.
3. Gilbert Gordon "Analytical Chemistry and Chemical Kinetics: A Chemical Model for Electrolyzed Salt Brine Disinfection Solutions", Presented at American Chemical Society "Elegant Analytical Chemistry Applied to Environmental Problems "Symposium" at the Annual Meeting of the American Chemical Society in San Diego, CA, 2 - 5 April 2001.
4. Gilbert Gordon "Ozone and Chlorine Dioxide for Water Treatment: Similar Chemical Issues and Measurement Problems", Presented at Bradley University, Peoria, IL When Receiving the Bradley University College of Liberal Arts and Sciences Distinguished Alumnus Award on 13 April 2001.
5. Gilbert Gordon and Mike Dimitriou " An Overview of the Joint IOA-PAG - USEPA Initial Bromate Ion Workshop" Presented at the Pan American Group International Ozone Association Annual Meeting in Newport Beach, CA, 7 - 9 May 2001.
6. Kerwin L. Rakness, Gilbert Gordon, Bernie Bubnis, David J. Rexing, Eric C. Wert, and Mark Tremel "The Impact of Under Estimating Dissolved Ozone Residuals Using

Standard Methods 4500-Ozone and Outdated Indigo" Presented at the Pan American Group International Ozone Association Meeting in Newport Beach, CA, 7 - 9 May 2001.

7. Gilbert Gordon "Why Chlorine Solutions Appear to Behave Differently: A Comparison of Electrolyzed Salt Brine and FAC", Presented at the 2001 Annual Conference of the American Water Works Association, Washington D.C. 17 - 21 June 2001.
8. Gilbert Gordon "Bulk Sodium Hypochlorite - Chemistry and Handling" Presented at the ACE Disinfection Systems Symposium "So You Want to Convert from Chlorine Gas to Hypochlorite?" at the 2001 Annual Conference of the American Water Works Association, Washington D.C. 17 - 21 June 2001.
9. Kerwin L. Rakness, Gilbert Gordon, Bernie Bubnis, David J. Rexing, Eric C. Wert, and Mark Tremel "Underestimating Dissolved Ozone Residuals Using Outdated or Impure Indigo" Presented at the World Congress of the International Ozone Association London, Great Britain, 10 - 14 September 2001.

#### **RECENT LECTURES AND/OR SEMINARS (2000)**

1. Gordon, G.; Walters, B.; Bubnis, B. "DPD --- Why Not for  $\text{ClO}_2$  and/or  $\text{O}_3$ ?", Presented at the American Water Works Association Annual Conference, Denver. CO, 10 - 14 June 2000.
2. Gordon, G.; Bubnis, B.; "Sodium Hypochlorite Specifications", Presented at the American Water Works Assoc. Annual Conference, Denver. CO, 10 - 14 June 2000.
3. Gordon, G.; Walters, B.; Bubnis, B. "The Effect of Indigo on Measuring the Concentration of Aqueous Ozone", Presented at the Pan American Regional International Ozone Association Conference, Orlando, FL, 1 - 4 October 2000.
4. Gordon, G. "Chemical Detail of Chlorine Dioxide Generation: Impurities and By-Products", Presented at the Water Quality Technology Conference, Salt Lake, UT, 4 - 7 November 2000.
5. Gilbert Gordon "The Mechanism of Ozone Decomposition and Measurement", Seminar Presented at Shinshu University, Nagano, Japan, 20 November 2000.

#### **RECENT LECTURES AND/OR SEMINARS (1999)**

1. Gilbert Gordon, Renee Gauw, Bryan Walters, James Goodrich, E.R. Krishnan, and Bernie Bubnis "Chemical Detail of Electrolyzed Salt Brine Solutions", Presented at the American Water Works Association Annual Conference, (Chicago, IL), 20-24 June 1999.
2. Gilbert Gordon and Bernie Bubnis "An Overview of Analytical Methods Associated with the Measurement of Ozone", Presented at the 14th Ozone World Congress, Dearborn, MI, 22 - 26 August 1999.
3. Gilbert Gordon "Evaluation of Kinetic Models for Ozone Decomposition: Limitations and Perspectives", Presented at the 14th Ozone World Congress, Dearborn, MI, 22 - 26



Aug. 1999.

4. Gilbert Gordon and Bernie Bubnis "Strategies for Meeting Sodium Hypochlorite Specifications in the Drinking Water Industry", Presented at the 15th Annual Chlorine / Chlorate Seminar: Technology Bridge to the New Millennium, Cleveland, OH, 13 - 15 September 1999.
5. Gilbert Gordon and Bernie Bubnis "Ozone Chemistry and Measurement", Presented at the International Ozone Association Seminar for Applications of Ozone for Drinking and Wastewater Treatment, Buenos Aires, Argentina, 17 September 1999.
6. Gilbert Gordon "Environmentally Friendly Methods of Water Disinfection: The Chemistry of Alternative Disinfectants", to be Presented at the GENES-3 International Symposium on Global Environment and Nuclear Energy Systems, Tokyo Institute of Technology, Tokyo, Japan, 14 - 17 December 1999.

#### RECENT LECTURES AND/OR SEMINARS (1998)

1. Gilbert Gordon and Bernie Bubnis "The Kinetics and Mechanism of  $\text{ClO}_3^-$  Formation Following the Electrolysis of Salt Brine: What Role Do  $\text{ClO}_2$  and/or  $\text{O}_3$  Play?", Presented at the Royal Society of Chemistry, Inorganic Reaction Mechanisms Conference, 6 - 9, Debrecen, HUNGARY, 5 January 1998.
2. Gilbert Gordon, "How to Measure  $\text{O}_3$  and/or  $\text{ClO}_2$  Formed (Along With Other Possible By-Products) During the Electrolysis of Salt Brine" Presented at Enviro-Chem Systems (Monsanto), Chesterfield, MO, 19 January 1998.
3. Gilbert Gordon and Bernie Bubnis "Predictive Chemistry: Chemistry of Disinfectants - Kinetic vs Thermodynamic Considerations", Presented at the ILSI Workshop: Identification of New and Uncharacterized Disinfection By-Products in Drinking Water, Washington D.C., February 11-13, 1998.
4. Gilbert Gordon and Bernie Bubnis "Predictive Chemistry: Identification of New and Uncharacterized Disinfection By-Products in Drinking Water", Presented at the ILSI Workshop: Identification of New and Uncharacterized Disinfection By-Products in Drinking Water, Washington D.C., February 11-13, 1998.
5. Gilbert Gordon "Development of Analytical Strategies -- a Panel Presentation", Presented at the ILSI Workshop: Identification of New and Uncharacterized Disinfection By-Products in Drinking Water, Washington D.C., Feb. 11-13, 1998.
6. Gilbert Gordon and Bernie Bubnis "Measuring  $\text{ClO}_2^-$ ,  $\text{ClO}_3^-$ ,  $\text{Br}^-$ , and  $\text{BrO}_3^-$  at the  $\mu\text{g/L}$  Level" Presented at the 1998 Inorganic Workshop, San Antonio, TX, 22 - 25 February, 1998.
7. Gilbert Gordon and Bernie Bubnis "The Photochemical Effect On Ozone and Chlorine Dioxide as Disinfectants for Drinking Water", Presented at the CHEMICAL OXIDATION, Technology for the Nineties, Ninth International Symposium, Vanderbilt University, Nashville, TN, 14 - 1 -3 April 1998.
8. Gilbert Gordon and Bernie Bubnis "The Chemistry of Mixed Oxidants -- Can Ozone and/or Chlorine Dioxide be Formed During the Electrolysis of Salt Brine? ", Presented

at the CHEMICAL OXIDATION, Technology for the Nineties, Ninth International Symposium, Vanderbilt University, Nashville, TN, 14 - 1 -3 April 1998.

9. Gilbert Gordon, Atilla Nemes and Istvan Fábián, "Evaluation of Kinetic Models for Ozone Decomposition: Limitations and Perspectives", Abstract Published -- International Ozone Conference in Conjunction with the International ECWATECH-98 Exhibition, Moscow, Russia, 25 - 29 May 1998.
10. Gilbert Gordon and Bernie Bubnis "The Chemical and Analytical Aspects of the Use of Chlorine Dioxide and Ozone in Water Treatment", Presented at the International Ozone Association Pan American Group Conference, Vancouver, British Colombia, Canada, 18 - 21 October 1998.

#### RECENT LECTURES AND/OR SEMINARS (1997)

1. Gary Emmert, Gilbert Gordon, and Bernie Bubnis "Chemical Characterization of the Electrochemical Production of Mixed Oxidants", Presented at the 1997 Pittsburgh Conference, Atlanta, GA, 16 - 21 March 1997.
2. Renee Gauw, Gilbert Gordon, and Bernie Bubnis "The Investigation of Inorganic By-Products Formed by the Electrolysis of Salt Brine", Presented at the 1997 Pittsburgh Conference, Atlanta, GA, 16 - 21 March 1997.
3. Hung Pham, Gilbert Gordon, and Bernie Bubnis "Determination of the Concentration of Transition Metal Ions in Liquid Bleach", Presented at the 1997 Pittsburgh Conference, Atlanta, GA, 16 - 21 March 1997.
4. Gilbert Gordon and Bernie Bubnis "Ozone Formation during the Electrolysis of Brine for Disinfection", Presented at Wasser Berlin - International Ozone Conference, Berlin, Germany, 21 - 23 April, 1997.
5. Gilbert Gordon, Hung A. Pham and Bernie Bubnis "Measurement of Transition Metal Ion Concentrations in Liquid Bleach", POSTER Presented at the 1997 American Water Works Association Annual Conference, Atlanta, GA, 17 - 21 June 1997.
6. Gilbert Gordon and Bernie Bubnis, "Eliminating Interferences When Measuring Multiple Disinfectants/Oxidants: Masks, Kinetics, and Flow Injection Analysis", Presented at the Environmental Laboratories: Moving to the 21st Century Conference (Water Environment Federation), Philadelphia, PA, 3 -6 August 1997.
7. Gilbert Gordon, and Bernie Bubnis "The Measurement of Ozone Formation During the Electrolysis of Brine for Disinfection, Presented at the Pan American Conference of the International Ozone Association, Lake Tahoe, Nevada, 17 - 20 August 1997.
8. Gilbert Gordon and Bernie Bubnis "The Photochemical Effects On Ozone and Chlorine Dioxide as Disinfectants for Drinking Water", The 5<sup>th</sup> Latin American Encounter on Photochemistry and Photobiology, Córdoba, Argentina, 14 - 18 September 1997.
9. Gilbert Gordon and Duane Powell "Stability and Decomposition of Delivered Liquid Bleach", East Bay Municipal Utility District, Oakland, CA, 16 October 1997.
10. Gilbert Gordon, Renee Gauw, Gary Emmert and Bernie Bubnis "Can Ozone and

Ozone Oxidative By-Products Be Formed During the Electrolysis of Salt Brine?"  
Ozone World Congress of the Int. Ozone Assoc., Kyoto, Japan, 26 - 31 Oct. 1997.

11. Hiroshi Tomiyasu, Yuichiro Asano, István Fábián and Gilbert Gordon "Oxidation Couple of Ozone and Cerium(III) Ion and its Application for the Dissolution of Uranium Dioxide", Ozone World Congress of the International Ozone Association, Kyoto, Japan, 26 - 31 October 1997.
12. Dean Gregory, Kenneth Carlson, Gilbert Gordon and Bernard Bubnis "Removal of Chlorite Ion in Natural Waters", Presented at the Water Quality Technology Conference, Denver, CO, 8 - 12 November 1997.

#### RECENT LECTURES AND/OR SEMINARS (1996)

1. Gilbert Gordon "Liquid Bleach Decomposition: Degradation and Chlorate Ion Formation", Presented at the 1996 Borchardt Conference: Advancements in Water and Wastewater Treatment, AWWA Press, Ann Arbor, Michigan, 1996.
2. Charles T. Pearson and Gilbert Gordon "The Measurement of Chlorine Dioxide in the Reaction of Malic/Malonic Acid With Sodium Chlorite", Presented at the Pittsburgh Conference, Chicago, IL, 3-8 March 1996.
3. Bryan D. Walters, Gary L. Emmert, Gilbert Gordon and Bernie Bubnis "Comparison of Analytical Techniques to Measure Bromate Ion and Chlorite Ion at the  $\mu\text{g/L}$  Level in Drinking Water", Presented at the Pittsburgh Conference, Chicago, IL, 3-8 March 1996.
4. Renee D. Gauw, Gary L. Emmert and Gilbert Gordon "The Evaluation of the Molar Absorptivity of Tribromide Ion and the Bromine Hydrolysis Constant", Presented at the Pittsburgh Conference, Chicago, IL, 3-8 March 1996.
5. Bernie Bubnis and Gilbert Gordon "Analytical Chemistry in Water Treatment", Presented at the CHEMICAL OXIDATION, Technology for the Nineties, Seventh Int'l Symp., Vanderbilt University, Nashville, TN, 14 - 18 April 1996.
6. Gilbert Gordon and Bernie Bubnis "A Comparison of Chlorine and Bromine For Chemical Oxidation/Disinfection", Presented at the CHEMICAL OXIDATION, Technology for the Nineties, Seventh Int'l Symp., Vanderbilt University, Nashville, TN, 14 - 18 April 1996.
7. Gilbert Gordon and Bernie Bubnis "The Role of Transition Metal Ions in the Decomposition of Liquid Bleach", Presented at the Hungarian Coordination Chemist Conference", Tata, Hungary, 5 - 8 June 1996.
8. Gilbert Gordon, Renee Gauw, Gary Emmert and Bernie Bubnis "The Use of Sulfite Ion or Reduced Iron for the Removal of Bromide Ion", Presented at the Water Quality Division at the 1996 American Water Works Association Annual Conference, Toronto, Canada, 23 - 27 June 1996.
9. Gilbert Gordon "Chlorine Dioxide -- An Overview", S.C. Johnson (Significant Technology Break-Through Group), Racine Wisconsin, 18 July 1996.
10. Gilbert Gordon "Chlorine Dioxide: Chemistry and Technology" Plenary Talk, First European Symposium on Chlorine Dioxide and Disinfection" Sponsored by the European

Chemical Industry Council, Presented, Rome, Italy, 7 November 1996.

11. Gilbert Gordon and Bernie Bubnis "Bleach Stability and Filtration", Presented at the 1996 Water Quality Technology Conference, Boston, MA, 17 - 21 November 1996.

#### **RECENT LECTURES AND/OR SEMINARS (1995)**

1. Gilbert Gordon "Minimizing Chlorate Ion Formation: A Case Study", Presented at the American Water Works Association Research Foundation Technology Transfer Conference "Coping With Disinfection By-Products", San Francisco, CA, Feb 1995.
2. Gilbert Gordon and Aaron Rosenblatt "Gaseous, Chlorine-Free Chlorine Dioxide for Drinking Water", Presented at the CHEMICAL OXIDATION, Technology for the Nineties, Sixth Int'l Symp., Vanderbilt University, Nashville, TN, 15 - 18 Feb 1995.
3. Bernie Bubnis and Gilbert Gordon "The Low-Level Measurement of Inorganic Disinfection By-Products by Ion Chromatography", Presented at the Pittsburgh Conference, New Orleans, 6-9 March 1995.
4. Gary L. Emmert, Renee D. Gauw and Gilbert Gordon "Determination of the Molar Absorptivities and Equilibrium Constants for Free Available Bromine Species by UV-Visible Spectrophotometry and Iodometric Analysis", Presented at the Pittsburgh Conference, New Orleans, 6-9 March 1995.
5. Gilbert Gordon and Bernie Bubnis "The Measurement of Very Low-Level Bromate Ion", Presented at the 12th World Congress of the International Ozone Association, Lille, France, 15 - 19 May 1995.
6. Gilbert Gordon "The Ozone Layer and Our Environment", Presented at the "Energy, Environment and Human Life in the Coming Century" at the Second Seminar of The Energy Research Center, Wakasa Bay, Fukui Prefecture, Japan, 29 May 1995.
7. Gilbert Gordon "The Decomposition of Aqueous Sodium Hypochlorite", Physical Chemistry Colloquium, Szeged University, Szeged, Hungary, 10 June 1995.
8. Gary L. Emmert, Renee D. Gauw and Gilbert Gordon "Preparation of Free Available Bromine Species and Measurement of Molar Absorptivities Using UV-Visible Spectrophotometry and Iodometric Analysis", Presented at the Symposium on Environmental Chemistry, 37th Rocky Mountain Conference on Analytical Chemistry, Denver, CO, 23-26 July 1995.
9. Gary L. Emmert and Gilbert Gordon "Glycine as a Quenching Agent for Ozone in Bromate Ion Formation Studies", Presented at the Symposium on Environmental Chemistry, 37th Rocky Mountain Conference on Analytical Chemistry, Denver, CO, 23-26 July 1995.
10. Gilbert Gordon and Bernie Bubnis "Chlorine Dioxide Chemistry Issues", Presented at the Third International Chlorine Dioxide Symposium, Sponsored by the Chemical Manufacturers Association and the American Water Works Association, New Orleans, LA, 14-15 September 1995.
11. Gilbert Gordon "Chemical Oxidation: Gaseous, Chlorine-Free Chlorine Dioxide for Drinking Water", Presented at the Environmental Chemicals Section of the World

Environmental Congress, London, Ontario, Canada, 17-22 September 1995.

12. Bryan D. Walters, Gary L. Emmert, Bernard Bubnis, Gilbert Gordon "A Comparison of Analytical Methods for Measuring Bromate Ion in Drinking Water, Presented at the Federation of Analytical Chemistry & Spectroscopy Societies, Cincinnati, OH, 16-18 October 1995.
13. Renee D. Gauw, Gary L. Emmert, Gilbert Gordon "Measurement of Molar Absorptivity of Tribromide Ion and Bromine Hydrolysis Constant Using UV-Visible Spectrophotometry and Iodometric Analysis", Presented at the Federation of Analytical Chemistry & Spectroscopy Societies, Cincinnati, OH, 16-18 October 1995.
14. Bernie Bubnis, Gilbert Gordon, Al Yoeman and Bill Beaumann " Bromate Ion Formation Resulting from Bromine Treatment", Poster Presented at Disinfection By-products in Drinking Water: Critical Issues in Health Effects Research Conference, Organized by ILSI and the USEPA in Chapel Hill, NC, 23 - 25 October 1995.
15. Gilbert Gordon and Aaron Rosenblatt "Gaseous, Chlorine-Free Chlorine Dioxide for Drinking Water" Presented at the Water Quality Technology Conference, New Orleans, LA, 12-16 November 1995.
16. Gilbert Gordon, Gary L. Emmert, Bernard Bubnis, "Bromate Ion Formation in Water when Chlorine Dioxide is Photolyzed in the Presence of Bromide Ion", Presented at the Water Quality Technology Conference, New Orleans, LA, 12-16 November 1995.
17. Ardy Assadi-Rad, Carolyn Oltman, Bernard Bubnis and Gilbert Gordon, "The Measurement of Chlorate Ion in Liquid Bleach", Presented at the Water Quality Technology Conference, New Orleans, LA, 12-16 November 1995.

#### RECENT LECTURES AND/OR SEMINARS (1994)

1. Gilbert Gordon "Chemical Models for the Formation of Chlorate Ion During the Storage of Liquid Bleach", Presented to Scientists, Engineers, and Utility Operators at East Bay Metropolitan Utility District, Oakland, CA, 25 January 1994.
2. Gilbert Gordon "The Formation of Chlorate Ion in Stored Hypochlorite Bleach", Presented at Metropolitan Water District of Southern California, San Dimas, CA, 26 January 1994.
3. Gilbert Gordon "The Use of Chlorpromazine for the Measurement of Bromate Ion at the  $\mu\text{g/L}$  Level", Metropolitan Water District of Southern California, San Dimas, CA, 26 January 1994.
4. Gilbert Gordon, Bernard Bubnis and Gilbert Pacey, "Ambient Chlorine Dioxide Measurements in the Presence of Chlorine", Presented at the CHEMICAL OXIDATION, Technology for the Nineties, Fifth Int'l Symp., Vanderbilt University, Nashville, TN, 20 - 22 Feb 1994.
5. Bernard Bubnis, Gilbert Gordon, Deborah Sweetin and Gilbert Pacey, "Measurement of Bromate Ion at the  $\mu\text{g/L}$  Level with Chlorpromazine", Presented at the Pittsburgh Conference, New York, NY, 8 -11 March 1994.
6. Bernard Bubnis, Gilbert Gordon and Gilbert Pacey, "Gas Phase Monitoring of Chlorine

- Dioxide in the Presence of Chlorine", Presented at the Pittsburgh Conference, New York, NY, 8 -11 March 1994.
7. Gilbert Gordon, "The Underlying Chemistry of the Alternative Disinfectants Used in Drinking Water", Department of Chemistry - Benjamin Harrison Symposium, Miami University, 7 March 1994.
  8. Gilbert Gordon, "Analytical Chemistry and Inorganic Reactions of Chlorine Dioxide", Presented at Western Michigan University, Kalamazoo, MI, 11 April 1994.
  9. Gilbert Gordon "The Chemistry and History of Wines and Wine-Making " Presented at the Procter & Gamble Analytical Symposium, Cincinnati, OH, 27 April 1994.
  10. Bernard Bubnis and Gilbert Gordon, "Minimizing Chlorate Formation: A Case Study", Presented at the American Water Works Association Research Foundation Technical Transfer Conference, St. Louis, MO, 18-19 August 1994.
  11. Gilbert Gordon, "The Chemistry and Reactions of Ozone in Our Environment", A Plenary Lecture Presented at the International Symposium on Global Environment and Nuclear Energy Systems, Susono (Mt Fuji), Japan, 24-27 October 1994.
  12. Gilbert Gordon, "Alternative Oxidizing Agents and Disinfectants", Tokyo Kogyo Daigaku - 100 Year Celebration, O-Okayama, Tokyo, Japan, 28 October 1994.
  13. Bernard Bubnis, Carolyn Oltman, Ardy Assadi-Rad and Gilbert Gordon, "The Measurement of Chlorate Ion in Liquid Bleach", Presented at the Water Quality Technology Conference, San Francisco, CA, 6-10 November 1994.

#### **RECENT LECTURES AND/OR SEMINARS (1993)**

1. Luke C. Adam and Gilbert Gordon, "The Direct and Sequential Analysis of Hypochlorite, Chlorite, and Chlorate Ions When Hypochlorite Ion is Present in Large Excess", at the Pittsburgh Conference, Atlanta, GA, 8-12 March 1993.
2. Larry F. Crawford and Gilbert Gordon, "Measurement of the Oxy-Chlorine Species in Decomposing Sodium Chlorite Solutions", at the PittCon, Atlanta, GA, 8-12 March 1993.
3. Gilbert Gordon and Bernard P. Bubnis, "Inorganic Disinfection By-Products: The Chemistry of Chlorine Dioxide", at Vulcan Chemicals, Wichita, KS, 8 April 1993.
4. Gilbert Gordon and Bernard P. Bubnis, "Sub  $\mu\text{g/L}$  Bromate Ion Measurements", at the Bromide, Bromate, Brominated Disinfection By-products ... Oh Brother!" American Water Works Association Symposium, San Antonio, TX, 6 June 1993
5. Luke C. Adam, Bernard P. Bubnis and Gilbert Gordon, "The Formation of Chlorate Ion in Stored Hypochlorite Bleach", Presented at the American Water Works Association Annual Conference, San Antonio, TX, 6-10 June 1993.
6. Gilbert Gordon, Luke C. Adam and Bernard P. Bubnis, "Minimizing Chlorate Ion in Drinking Water When Hypochlorite Ion is the Chlorinating Agent", Presented at the American Water Works Assoc. Annual Conference, San Antonio, TX, 6-10 June 1993.
7. Gilbert Gordon, "A Chemical View of How to Minimize Bromate Ion Formation During

- the Ozonation of Bromide Containing Waters", Presented at the 11th Ozone World Congress, San Francisco, CA, 29 August - 4 September, 1993.
8. Gilbert Gordon, Bernard P. Bubnis and Luke C. Adam, "Part II: Investigation of the Source of Chlorate Ion Formation in Drinking Water When Hypochlorite Ion is the Chlorinating Agent", Presented at the Water Quality Technology Conference, Miami FL, 14-18 November 1993.
  9. Gilbert Gordon, "The Chemical Aspects of Bromate Ion Control in Ozonated Drinking Water Containing Bromide Ion", Presented at the Bromates and Water Treatment International Workshop, Paris, France, 22-23 November, 1993.
  10. Gilbert Gordon, "Can Chlorate Ion Be Controlled In Drinking Water Disinfected With Liquid Bleach?", American Water Services Company, Vorhees, NJ, 17 December 1993.

#### RECENT TALKS AND/OR SEMINARS (1992)

1. Gilbert Gordon, Gilbert E. Pacey, Gordon R. Finch, and Bernard P. Bubnis, "Slurry-Ozone Technology for On-Site Treatment of Contaminated Soils", at the CHEMICAL OXIDATION, Technology for the Nineties, Second International Symposium, Vanderbilt University, Nashville, TN, 19 - 20 Feb 1992.
2. Gilbert Gordon and Deborah Sweetin, Comparison of Newly Developed Automated Colorimetric Techniques for the Speciation of Free and Combined Chlorine", at the Pittsburgh Conference, New Orleans, LA, 9-13 March 1992.
3. Gilbert Gordon, Kerwin Rakness, and C. Michael Robson, "Ozone Concentration Measurement in a Process Gas (Proposed Int. Ozone Assoc. Guideline)", At the International Ozone Meeting in Pasadena, CA, 10-12 March 1992.
4. Gilbert Gordon, "The Water Chemistry of Oxy-Chlorine Species", Presented at the International Symposium on  $\text{ClO}_2$ : Drinking Water Issues, Houston, TX, 7-8 May 1992.
5. Mark H. Griesse, Jerry J. Kayzur and Gilbert Gordon "Combined Methods for the Reduction of Oxychlorine Residuals in Drinking Water", Presented at the Int. Symp. on Chlorine Dioxide: Drinking Water Issues, Houston, TX, 7-8 May 1992.
6. Gilbert Gordon and Luke C. Adam, "Analysis of the Decomposition of Hypochlorous Acid in the pH 6 to 8 Region Presented at the Central Regional Meeting of the Am. Chem. Soc., Cincinnati, OH, 26-29 May 1992.
7. Bernie P. Bubnis, Gilbert Gordon and Gilbert E. Pacey, "Comparison between FIA and IC Methods for Chlorite and Chlorate Ions", Presented at the Central Regional Meeting of the Am. Chem. Soc., Cincinnati, OH, 26-29 May 1992.
8. Gilbert Gordon, "Chlorate Ion and Hypochlorination", Presented at the Technical Advisory Workgroup Meeting, American Water Works Association Annual Meeting, Vancouver, British Columbia, Canada, 18 June 1992.
9. Gilbert Gordon, "Kinetics and Mechanism of Oxy-Halogen Reactions" at The Ohio State University, 4 June 1992.
10. Gilbert Gordon, "Analytical Methods for Disinfectants and Disinfection By-products", Presented at the First Intl. Conf. on the Safety of Water Disinfection and Microbial Risks, Washington, D.C., 31 August - 3 September 1992.

11. Gilbert Gordon, Bernie P. Bubnis and Luke C. Adam, Investigation of the Source of Chlorate Ion Formation in Drinking Water When Hypochlorite Ion Is The Chlorinating Agent", presented at the Water Quality Technology Conference, Toronto, Ontario, Canada, 15-19 November 1992.

#### RECENT TALKS AND/OR SEMINARS (1991)

1. Gordon, G. "Redox Reactions and the Analytical Chemistry of Chlorine Dioxide and Ozone" at the CHEMICAL OXIDATION, Technology for the Nineties, First Int'l Symp., Vanderbilt University, Nashville, TN, 20 - 22 Feb 1991.
2. Gordon, G. "The Role of Highly Reactive Intermediates in the Decomposition of Aqueous Ozone", 10th Ozone World Congress, Monaco, Monte Carlo, Monaco, 19 March 1991.
3. Gordon, G. "Review of the Analytical Methods for Determining Aqueous and Gas Phase Ozone Concentration (Laboratory Methods and Process Equipment)", 10th Ozone World Congress, Monaco, Monte Carlo, 21 March, 1991.
4. Gordon, G. "The Chemical Reactions of Ozone in Aqueous Solution -- The Role of Highly Reactive Intermediates", Oakland University, Oakland, MI, 10 April 1991.
5. Gordon, G. "The Chemistry of Chlorine Dioxide and Its By-products: Chlorine Dioxide Generation and Measuring Oxidant Demand", Chlorine Dioxide Water Disinfection Seminar, Austin Texas, 25 April 1991.
6. Gordon, G. "Current Status of Disinfectant Residuals", at the American Water Works Association -- Research Foundation Technology Transfer Workshop, New Orleans, Louisiana, 21-22 May 1991.
7. Gordon, G. "Inorganic Disinfection By-product Removal Strategies", American Water Works Association Seminar, Philadelphia, Pennsylvania, 23 June 1991.
8. Gordon, G. "The Inorganic and Analytical Chemistry of Ozone and Chlorine Dioxide", The City of Edmonton Environmental Services, Edmonton, Alberta, Canada, 23 July 1991.
9. Gordon, G. and Fábíán, I. "Redox Reactions of Aqueous Chlorine(III):Inorganic Application of the Quenched Stopped-Flow Method", at the 33rd IUPAC Congress in Budapest, Hungary, 20 August 1991.
10. Gordon, G.; Sweetin, B.; Smith, K.; Pacey, G.E. "Improvements in the Analytical Methodology for Distinguishing Free Available Chlorine and the Inorganic Chloramines", at the Water Quality Technology Conference, Orlando, Florida, 10-14 November 1991.
11. Gordon, G. "Electron Transfer Reactions Involving Oxy-Chlorine Intermediates" at the CHB Symposium, Michigan State University, East Lansing Michigan, 21 November 1991.
12. Gordon, G. "Alternatives to Chlorine in Water Purification: The Pros and Cons of Ozone and Chlorine Dioxide" at Chatham College, Pittsburgh, PA, December 1991.

#### RECENT TALKS AND/OR SEMINARS (1990)



1. Chelkowska, K.; Grasso, D.; Fabian, I.; Gordon, G. "Numerical Simulations of Aqueous Ozone Decomposition: Comparison of Mechanisms" at the Int'l Ozone Association Pan American Meeting, Shreveport, Louisiana, 1990.
2. Gilbert Gordon, "Current Status of Disinfectant Residuals", at the American Water Works Association -- Research Foundation Technology Transfer Workshop, Oakland, CA, 8-9 May 1990.
3. Gilbert Gordon, "The Use of Chlorine Dioxide and Ozone in the Treatment of Water Used In Making Soft Drinks", Water Quality Committee of the National Soft Drink Association, Cincinnati, OH, 10 May 1990.
4. Gilbert Gordon, "The Removal of Chlorite Ion From Drinking Water after Treatment with Chlorine Dioxide", The 1990 Annual Conference and Exposition of the American Water Works Association, Cincinnati, OH, 18 June 1990.
5. Delmer Wood and Gilbert Gordon, "The Determination of Low-Level Concentrations of the Oxy-Chlorine Species in Drinking Water", Annual Conference and Exposition of the Am. Water Works Assoc., Cincinnati, OH, 20 June 1990.
6. Gilbert Gordon, "Chlorine Dioxide and Its Anion", Am. Chem. Soc. Environmental Chemistry Division, Disinfection By-Products Symposium, Washington, D.C., 29 August 1990.
7. Gilbert Gordon, "The Analysis of Ozone", at Ozone in Water Treatment: Application and Engineering: Technology Transfer Conf. Sponsored by the Am. Water Works Assoc. Research Foundation, St Louis, MO, 30-31 Oct 1990.
8. Gilbert Gordon, "An Evening of Wine Tasting and Wine Evaluations", Upper Ohio Valley Section of the Am. Chem. Soc. , Blennerhassett Hotel, Parkersburg, West Virginia, 18 December 1990.

#### RECENT TALKS AND/OR SEMINARS (1989)

1. Gilbert Gordon, Del Wood, Dimitrios G. Themelis and G. E. Pacey, "The Determination of Chlorine Dioxide, Chlorite Ion, and Chlorate Ion By Using FIA", Winter FIA Conference, Orlando, Florida, 5-7 January, 1989.
2. Gilbert Gordon, "Current Status of Disinfectant Residuals", at the American Water Works Association -- Research Foundation Technology Transfer Workshop, Atlanta, Georgia, 7-8 February, 1989.
3. Gilbert Gordon, Delmer W. Wood, and Dimitrios G. Themelis, "Determination of Sub-mg/L Levels of Oxy-chlorine Species by Using Flow Injection Analysis", 40th Pittsburgh Conference, Atlanta, Georgia, 6-10 March, 1989.
4. Gilbert Gordon, "Current Status of Disinfectant Residuals", at the American Water Works Association -- Research Foundation Technology Transfer Workshop, Edmonton, Canada, 6-7 April, 1989.
5. Gilbert Gordon, "Analytical Chemistry and Inorganic Reactions of Chlorine Dioxide", at the Chemical Manufacturers Association International Symposium on Chlorine Dioxide: Scientific, Regulatory and Application Issues, Denver, CO, 1-2 Nov., 1989.

6. Gilbert Gordon, "An Overview of Ozone Measurements", at the Water Quality Technology Conference (Invited paper by the Am. Water Works Association - Research Foundation), Philadelphia, PA, 14-15 November 1989.

#### **RECENT TALKS AND/OR SEMINARS (1988)**

1. Gilbert Gordon, H. Tomiyasu, and S. Nakareseisoon, "The Mechanism of Ozone Decomposition in Highly Basic Solution", Internat'l Symp. the Molecular and Dynamic Approach to Electrolyte Solutions at the 100th Anniversary Celebration of Tokyo Kogyo Daigaku (Tokyo Institute of Technology), 11 January 1988.
2. Gilbert Gordon and H. Tomiyasu, "Kinetics and Mechanism of the Reaction between Ozone and Iron Complexes", International Symposium on the Molecular and Dynamic Approach to Electrolyte Solutions at the 100th Anniversary Celebration of Tokyo Kogyo Daigaku (Tokyo Institute of Technology), 11 Jan 1988.
3. Gilbert Gordon and Delmer Wood III, "Comparison of Methods for Gas Phase Ozone Determination in Water Treatment", 39th Pittsburgh Conf, New Orleans, 22 - 26 February 1988.
4. Gilbert Gordon "Disinfectant Residual Measurement Methods" at the American Water Works Association -- Research Foundation Technology Transfer Workshop, University City (Burbank), 23 March 1988.
5. Gilbert Gordon and Gilbert E. Pacey, "The Use of Selectivity and Kinetic Control in the Measurement of Disinfectant Residuals Using FIA", Flow Analysis IV, Las Vegas, Nevada, 17 - 20 April 1988.
6. Gilbert Gordon, Kerwin Rakness, David Vornehm, and Delmar Wood III, "Complications in the Iodometric Determination of Ozone" Int'l Ozone Association Pan American Conference, Monroe Michigan, 27 - 29 April 1988.
7. Gilbert Gordon "Disinfectant Residual Measurement Methods" at the American Water Works Association -- Research Foundation Technology Transfer Workshop, Chicago, Illinois, 17 - 19 May 1988.
8. Gilbert Gordon "The Role of Transition Metal Ions on Oxy-Halogen Redox Reactions", XXVI International Conference on Coordination Chemistry, Porto, Portugal, 29 August - 3 September 1988.
9. Gilbert Gordon and Gilbert E. Pacey, "Masking Agents, Selectivity, and Kinetic Control in the Measurement of Disinfectant Residuals", at the Recent Advances in Kinetic Methods Symposium of the Division of Analytical Chemistry of the Am. Chem. Soc. at the Los Angeles Meeting of the Am.Chem.Soc., 25 - 30 Sept. 1988.
10. Gilbert Gordon, Technology Transfer in Water Disinfection and Waste Water Treatment:", Trade with China: Prospects and Opportunities - an International Conference, Miami University, 20 - 22 November, 1988.

**PUBLICATIONS (in reverse chronological order):**

247. Keith, J; Pacey, G.E.; Cotruvo, J.A.; Gordon, G. "Experimental Results from the Reaction of Bromate Ion With Synthetic and Real Gastric Juices", *J. Toxic & Env Health*, (In Process; **2005**).
246. Keith, J; Pacey, G.E.; Cotruvo, J.A.; Gordon, G. "Preliminary Data on the Fate of Bromate Ion in Simulated Gastric Juices", *Ozone: Science and Engineering*, Submitted for Publication **May 2005**, (Currently in Review).
245. Keith, J; Pacey, G.E.; Gordon, G. "Measurement of Bromate Ion I High Chloride Ion Solutions Using Ion Chromatography", *Analytical Chimica Acta*, Submitted **April 2005**, (Currently in Review).
244. Pepich, B.V.; Dattilio, T.A.; Fair, S.F.F.; Munch, D.J.; Gordon, G.; and Körtvélyesi, Z. "An Improved Method for the determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry", *Analytical Chemistry*, Submitted for Publication, **March 2005**, (Currently in Revision).
243. Gordon, G. and Rosenblatt, A. "Chlorine Dioxide: The Current State of the Art", *Ozone Science and Engineering*, **2005**, 27, 203-207.
242. Gordon, G. and Rice, R. "Evolution of Ozone Technology in the United States" The Ozone Handbook (In Commemoration of the 10<sup>th</sup> Anniversary of the Japanese Ozone Association), Published in Japanese, by the Japan Ozone Association, **2004**, 17-30.
241. Körtvélyesi, Z.; Gordon, G. "Chlorite Ion Interference in the Spectrophotometric Measurement of Chlorine Dioxide", *J. Am. Water Works Assoc.*, **2004**, 96 (9) xxxxxxxx..
240. Gordon, G.; Bolden, R.; Emmert, G. "Measuring Oxidant Species in Electrolyzed Salt Brine Solutions", *J. Am. Water Works*, **2002**, 94 (10), 111-120.
239. Gordon, G.; Bubnis, B. "Residual Ozone Measurement: Indigo Sensitivity Coefficient Adjustment", *Ozone Science and Engineering*, **2002**, 24, 17-28.
238. Gordon, G.; Gauw, R.D.; Emmert, G.; Walters, B.; Bubnis, B. "A Comparison of Sulfite Ion and Reduced Iron for the Removal of Bromate Ion", *J. Am. Water Works Assoc.*, **2002**, 94 (2), 91-98.
237. Finch, G.R.; Haas, C.N.; Oppenheimer, J.A.; Gordon, G. "Design Criteria for Inactivation of *Cryptosporidium* by Ozone in Drinking Water", *Ozone Science and Engineering*, **2001**, 23, 259-284.
236. Rakness, K.L.; Gordon, G.; Bubnis, B.; Rexing, D.J.; Wert, E.C.; Tremel, M. "The Impact of Under Estimating Dissolved Ozone Residuals Using Standard Methods 4500-Ozone and Outdated Indigo" Proc. Pan American Regional IOA Conference, Newport Beach, CA, Published by the International Ozone Association (Stamford, CN), **2001**, CD ROM I-12, pp 155-165.
235. Nemes, A.; Fábíán, I.; Gordon, G. "Kinetics and Mechanism of Aqueous Ozone Decomposition in Alkaline Solution", *Inorg. Reaction Mechanisms*, **2000**, 2, 327-341.
234. Adam, L.; Gordon, G. "Bleach 2001", *J. Am. Water. Works Assoc.*, CD-ROM Series **2001**, AWWARF/AWWA, Text 82 pp + CD-ROM, **2001**.
233. Csordás, V.; Bubnis, B.; Fábíán, I.; Gordon, G. "Kinetics and Mechanism of the Oxidation of Chlorine Dioxide by HOCl", *Inorg. Chem.*, 40, 1833-1836, **2001**.

232. Gordon, G. "Chlorine Dioxide Generation Impurities and By-Products -- Is All Chlorine Dioxide Created Equal?" J. Am. Water Works Assoc., 93 (4), 163-173, 2001.
231. Gordon, G.; Gauw, R.D.; Miyahara, Y.; Walters, B.; Bubnis, B.; "Using Indigo Absorbance to Calculate the Indigo Sensitivity Coefficient", J. Am. Water Works Assoc., 2000., 92 (12), 96-100.
230. Gordon, G.; Walters, B.; Bubnis, B. "The Effect of Indigo on Measuring the Concentration of Aqueous Ozone", Proc. Pan American Regional IOA Conference, Orlando, FL, Published by the International Ozone Association (Stamford, CN), 2000, CD ROM I-12, pp 135-149.
229. Gordon, G. "Chemical Detail of Chlorine Dioxide Generation: Impurities and By-Products", Proc. Water Qual. Tech. Conf. (Salt Lake, UT), Am. Water Works Assoc., Denver, CO, 2000, 3E8/1 - 3E8/12 (and CD-ROM Version, Record E-8, 10 pp).
228. Gordon, G. "Environmentally Friendly Methods of Water Disinfection: The Chemistry of Alternative Disinfectants", Progress in Nuclear Energy Journal(Global Environment & Nuclear Energy Systems - 3 International Symposium), Tokyo, H. Ninokata and T. Sawada, Editors, 2000, 37, 37-41.
227. Fábíán, I.; Szücs, D. Gordon, G. "Unexpected Phenomena in the Mercury(II) - Chlorite Ion System: The Formation and Kinetic Role of the  $\text{HgClO}_2^+$  Complex", J. Phys. Chem., 2000, 104 A, 8045-8049.
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225. Nemes, A.; Fábíán, I.; Gordon, G. "Experimental Aspects of Mechanistic Studies on Aqueous  $\text{O}_3$ " Decomposition in Aqueous Solution, Ozone, Science and Engineering, 2000, 22, 287-304.
224. Gordon, G.; Walters, B.; Bubnis, B. "DPD --- Why Not for  $\text{ClO}_2$  and/or  $\text{O}_3$ ?", Proc. Ann. Conf. AWWA, (Denver, CO), American Water Works Association, 88 - 98, 2000, CD ROM W-14, 7, 10 pp.
223. Gordon, G.; Bubnis, B.; "Sodium Hypochlorite Specifications", Proc. Ann. Conf. AWWA, (Denver, CO), American Water Works Association, 123 - 135, 2000, CD ROM W-12, 7, 12 pp.
222. Gauw, R.D.; Emmert, G.L.; Bubnis, B.; Gordon, G. "High Resolution Spectrophotometry for Identification of Chlorine Dioxide in Concentrated Chlorine Solutions", Talanta, 1999, 50, 1073-1078.
221. Gordon, G.; Bubnis, B. "Ozone and Chlorine Dioxide: Similar Chemistry and Measurement Issues", Ozone, Science and Engineering, 1999, 21, 447-464.
220. Gordon, G.; Bubnis, B. "Strategies for Meeting Sodium Hypochlorite Specifications in the Drinking Water Industry", Compendia -- Technology Bridge to the New Millennium, Eltech Systems Corporation Publication, pp 254-259, 1999.
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218. Gordon, G.; Bubnis, B. "An Overview of Analytical Methods Associated with the Measurement of Ozone", Proc. 14th Ozone World Congress, Dearborn, MI, Published by IOA, (Dearborn, MI), 1999, 1, 491-496.

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215. Gordon, G.; Gauw, R.D.; Emmert, G. E.; Bubnis, B. "The Kinetics and Mechanism of  $\text{ClO}_3^-$  Formation Following the Electrolysis of Salt Brine: What Role do  $\text{ClO}_2$  and/or  $\text{O}_3$  Play?", Acta Chimica Hungarica - Models in Chemistry, 1998, 135, 799-809.
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213. Gordon, G. and Bubnis, B. "Ozone and Chlorine Dioxide for Water Treatment: Similar Chemistry Issues and Measurement Problems", Proceedings, International Ozone Assoc. Pan American Group Annual Conference, Vancouver, Canada, 1998.
212. Gordon, G.; Bubnis, B. "Can Ozone and/or Chlorine Dioxide be Formed During the Electrolysis of Salt Brine?", CHEMICAL OXIDATION, Technology for the Nineties, Ninth International Symposium, 7 75-82, 1998.
211. Gordon, G.; Bubnis, B. "The Photochemical Effect on Ozone and Chlorine Dioxide as Disinfectants for Drinking Water", CHEMICAL OXIDATION, Technology for the Nineties, Ninth International Symposium, Submitted 7, 48-54, 1998.
210. Gordon, G. and Bubnis, B. "Predicting and Measuring the Presence of Inorganic Species", Amy Burk, Editor, Workshop on the Identification of New and Uncharacterized Disinfection By-Products in Drinking Water, US EPA / ILSI, 2, 23-25, 1998.
209. Gordon, G. and Bubnis, B. "Chemistry of Disinfectants - Kinetic vs Thermodynamic Considerations", Amy Burk, Editor, Workshop on the Identification of New and Uncharacterized Disinfection By-Products in Drinking Water, US EPA / ILSI, 2, 33-38, 1998.
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